Labour-market indicators: an inventory

LABOUR-MARKET INDICATORS: AN INVENTORY

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CONTENTS

SUMMARY

This study is, first, an inventory of indicators of labour-market performance for occupational and educational categories. Second, it suggests ways to use the indicators as a source of information for educational and occupational counselling, educational planning, and employers' recruitment strategies. Third and last, it discusses how labour-market forecasts and indicators can be combined in an education-labour market information system. There are two possibilities: either to treat labour-market indicators as separate supplementary indexes, or to integrate them in 'flexibilised' labour-market forecasts.

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1. INTRODUCTION

By commission of the Ministry of Education and Sciences, the Research Centre for Education and Labour Market is developing an education/labour-market information system, as a tool for educational and occupational counselling to students in secondary and higher education. The information system may also be useful for capacity planning of educational facilities and for recruitment strategies of both the private and the public sector (see also Heijke, 1986).

The main elements of the information system are forecasts of the labour-market prospects of occupations and types of training. However, educational and occupational counsellors as well as those responsible for recruitment strategies of work organisations also feel a need for 'labour-market indicators' (De Grip, Heijke, Dekker, Groot and Vos 1987; Van Paridon 1987). In educational and occupational counselling, labour-market forecasts primarily serve to indicate the chance of graduates' finding their first job. However, it is also important to graduates to know their chances on the labour market later in their career, and the risks they run. De Grip, Heijke, Dekker and Groot (1987) made an effort to satisfy that need by labour-market indicators of the sensitivity of employment in the various occupational groups to the business cycle, and of the potential mobility to alternative occupations and branches of industry associated with types of training and occupational groups.

With respect to the present labour-market situation, too, there is a demand for labour-market indicators. Employers, for instance, need indicators to guide their recruitment efforts on the various labour-market segments. Such *monitoring* indicators also point out directions for short-term retraining projects or other labour-market policies. Moreover, indicators of the current labour-market situation can be helpful to policies with regards to regular education, for instance when a policy to broaden the qualification profile of a given type of education needs to be tested. Whether a broader curriculum leads to a wider spread of graduates among occupations and/or economic sectors can be established with only a short delay by means of monitoring indicators. In a more general sense, too, such flexibility indicators show up nicely how a curriculum is functioning with respect to

the labour-market.

This study sets out to give a first inventory of the types of labour-market indicators that might be constructed. In each instance, the significance and computation of the indicator will be explained first, after which suggestions will be made how to use the indicator in educational and occupational counselling, educational planning and employers' recruitment strategies. Finally, the availability of adequate data for the computation of the indicator in question will be indicated, and suggestions are made for obtaining better data.

The inventory of labour-market indicators occupies the second chapter, which will present in succession indicators of: the present scarcity on the labour market (section 2.1), the replacement demand and the absorption degree of occupations (section 2.2), the sensitivity to the business cycle of occupations and educations (section 2.3), the potential mobility for occupations and educations (section 2.4), the competitiveness of types of training (section 2.5), and the access and quit mobility of occupations (section 2.6). Chapter 3 discusses the relation between labour-market forecasts and labour-market indicators. At that point, there are two possibilities: to treat labour-market indicators as separate supplementary indexes (section 3.1), or to combine labour-market forecasts and indicators to predict the labour-market situation of different occupational groups or educational categories (section 3.2). The final chapter sums up the main results.

2. LABOUR-MARKET INDICATORS

2.1. Indicator of current scarcity on the labour market

Van Paridon (1987) tried to develop a monitoring indicator of the current scarcity on the labour market of several specific categories of training. His indicator is simply the rate of unemployment among schoolleavers of a certain type of education corrected for the 'pollution' of the registered unemployment data. Van Paridon has used this scarcity indicator to make a typology of the labour-market situation of various study branches. His assumption is that the labour market of schoolleavers is in equilibrium at a corrected unemployment rate of 5 to 7 per cent, which corresponds to a registered unemployment of no less than 15 per cent. Table 1 shows how the typology of the labour market situation is accomplished.

Table 1. Computation of the scarcity indicator and corresponding typology of the labour-market situation

Corrected unemployment rate	Labour-market indicator	Typology of labour-market situation
3 %	0 - 50	large shortage
3 - 5 %	51 - 83	shortage
5 - 7 %	84 - 117	equilibrium
7 - 9 %	118 - 150	surplus
> 9 %	> 150	large surplus

Source: Van Paridon (1987).

This labour-market indicator was developed to fill the need of firms for an index indicating how the labour market for hard-to-recruit educational categories is developing. The group of unemployed schoolleavers was undoubtedly chosen because for this group an unemployment *rate* can be constructed from directly available outflow data of the educational system in contrast to data on the labour force, which until recently only came available sample-wise once in every two years and after long delays (Labour-Force Censuses). The indicator also corresponds rather well to the recruitment behaviour of firms, in particular large ones which have a so-

called 'internal labour market' at their disposal (Van Bergeijk & De Grip 1986), because their recruitment strategy focuses mainly on schoolleavers as a target group.

However, the choice of a corrected unemployment rate of 5 to 7 per cent as criterion for a balanced labour market is arbitrary, and indeed on the high side in terms of educational planning and counselling. Actually, the unemployment rate experienced as a 'balanced market' may vary widely for individual firms. The firm's position on a labour-market segment is an important factor in that respect. Firms with a high appeal to schoolleavers may find it easy to recruit new labour even at a low rate of unemployment, while firms with less appeal may have trouble even at a corrected unemployment rate of 7 per cent, because schoolleavers may prefer staying unemployed for some time to taking a job in such a firm, holding out for a job with a firm which offers better career prospects.

Nevertheless the conclusion may be that this indicator of current scarcity can be used as a *monitoring* indicator of the situation on the labour market. Further empirical analysis will be necessary to answer the question at what (corrected) unemployment rate a particular labour-market segment can be said to be balanced.

At the moment, the scarcity indicator can be computed from detailed information about the formally registered unemployment (ISVA-files) and the CPB schoolleaver forecasts, which can be broken down with the help of figures from various CBS education statistics about the number of graduates. In view of the indicative nature of this scarcity criterion, the demand for better-quality data is not great, although the instant availability of corrected unemployment figures would improve the indicator.

2.2. Replacement demand and absorption degree of occupations

De Grip, Heijke and Vos (1987) have developed two indicators, one of the relative replacement demand (RRD) in occupations, and the other of the degree to which young people have found employment in these occupations, the so-called 'relative absorption degree' (RAD). These indicators have been computed as follows:

$$RRD_i = \frac{\text{percentage workers 50-64 years old in occupation i}}{\text{percentage workers 50-64 years old in total employment}} \quad (1)$$

$$RAD_i = \frac{\text{percentage workers < 30 years old in occupation i}}{\text{percentage workers < 30 years old in total employment}} \quad (2)$$

A value > 1 expresses, respectively, a large relative replacement demand or a large relative absorption of young workers in the occupation concerned. Both indicators need correction to prevent a distorted image. The RRD can lead to the overestimation of the expected replacement demand in an occupational group where employment growth has been stagnant for some time, because then the effective replacement of retiring older workers by younger ones is doubtful in such cases. To avoid such distortions, the RRD indicator is weighted with the index of the relative development of employment during the previous decade (De Grip, Heijke and Vos, 1987).

The RAD-indicator needs correction for the fact that the age group under 30 comprises more cohorts of schoolleavers of the lower than of the higher educational levels. Consequently, the absorption degree of occupations in which relatively many higher-educated workers are employed, may be underestimated. The following correction factors were developed: 14/12 (of the proportion of higher secondary schoolleavers), 14/11 (of the proportion secondary vocational schoolleavers), 14/8 (of the proportion of higher vocational graduates) and 14/6 (of the proportion of university graduates) (see De Grip, Heijke and Vos, 1987)[1].

The RRD criterion is meant as a first indicator of the replacement demand in the different occupations. The information it conveys is relevant to study and occupation counselling as well as educational planning and employers' recruitment strategy. But to construct such an indicator from past data does not make much sense as long as forecasts of future replacement demand can also be drawn up in the framework of ROA-forecasts of medium-term labour-market developments (see De Grip, Heijke, Dekker and Groot, 1987).

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1. The correction factors are based on the difference between the modal age at which students leave school at the educational level concerned, and the age of 16 years old (end of compulsory education). Each time a comparison is made with the upper limit of the analysed cohort (30 years).

The RAD, on the contrary, is indeed useful to establish what occupations can be considered as entry-ports for newcomers on the labour market. That is the type of information that is helpful to educational and occupational counselling as well as to policy efforts to achieve a better match between education and the first jobs of newcomers on the labour-market, jobs which may form an important bridge to later careers.

Both indicators can now be calculated from CBS Labour-Force Censuses. The expectation is that similar indicators can be computed from the Labour-Force Survey. The future quality might be considerably improved if the occupational classification used by the CBS was more closely associated with the actual functioning of the labour market. The CBS is currently making a start in that direction (Jonker 1987).

2.3. Sensitivity to the business cycle

As a complement to medium-term forecasts which give an indication of future employment prospects at the moment when students now starting their studies will be looking for their first job, De Grip, Heijke, Dekker and Groot (1987) have tried to provide information about the job guarantee in an occupation in view of the *cyclical fluctuations* of employment. To that end, for every branch of industry the following *fluctuation index* has been constructed (see also NEI 1972):

$$FI_j = \frac{100}{H} \sum_{t=1}^{H} \frac{|F_{jt}|}{T_{jt}} \qquad (3)$$

Where: FI_j = fluctuation index of sector j
H = number of years of observation
t = year
F_{jt} = deviation of employment from the trend-wise employment development in sector j at time t
T_{jt} = trend-wise development of employment in sector j at time t

On the assumption that employment in individual occupations within a sector fluctuates to the same extend (an assumption that is indeed not quite warranted, see Dekker, De Grip and Heijke 1988), a fluctuation index can be derived for the various occupations by weighting the fluctuation indexes of the various sectors with an occupation's share in the employment of the

sector in question:

$$OS_i = \sum_{j=1}^{J} \frac{E_{ij}}{E_i} FI_j = \sum_{j=1}^{J} \alpha_{ij} FI_j \qquad (4)$$

Where: OS_i = indicator of the sensitivity of occupation i to the business cycle
E_{ij} = number of employed in occupation i engaged in sector j
E_i = total number of employed in occupation i
α_{ij} = share of occupation i employed in sector j
J = number of sectors

Similarly, an indicator can be computed for the sensitivity to the business cycle of employment in the various categories of education. The assumption (again not quite warranted) is that the employment of the various categories of education fluctuates to the same extent within a sector. The computation then proceeds as follows:

$$TS_k = \sum_{j=1}^{J} \frac{E_{kj}}{E_k} FI_j = \sum_{j=1}^{J} \beta_{kj} FI_j \qquad (5)$$

Where: TS_k = indicator of the sensitivity of training k to cyclical movements
E_{kj} = number of k-trained employed in sector j
E_k = total number of k-trained employed
β_{kj} = proportion of k-trained workers employed in sector j

A typology of the sensitivity of occupations and types of training to cyclical fluctuations in employment growth can be based on the average value of the cyclical indicator. Along this way De Grip, Heijke, Dekker and Groot (1987) developed a five-point scale.

A weakness of this indicator is, as remarked before, the assumption of even cyclical fluctuations of occupational and educational categories within a sector, an assumption that has to be made because long time series of employment figures by occupation and training are still lacking.

The two cyclical indicators are especially important to educational study and occupational counselling. They are also useful for job-creating and

retraining policies and for planning regular education, because they permit taking into account that shortages or surpluses of workers for occupations and types of training that are highly sensitive to cyclical fluctuations, may well be temporary. Naturally, for a well considered judgement, the sensitivity indicator should be related to medium-term forecasts of the developments on the labour market.

To compute indicators of the cycle-sensitiveness of employment growth by sector, labour-volume data from the National Accounts are available. The shares of occupations and types of training in employment in the various sectors can be derived from data of the Labour-Force Censuses, and as far as future growth is concerned, from the figures of medium-term forecasts.

2.4. Potential mobility to alternative occupations and types of training

2.4.1. Dispersion indicators

Van Hoof and Dronkers (1980) criticised the popular vision of an exclusive relation between a given type of training and a certain occupation. That vision, which they characterise as the 'naive model' of the labour market, overlooks the flexibility of the links between types of training and occupations. For a better performance of the labour market, Van Hoof and Dronkers plead a policy aimed at increasing that flexibility by broadening the qualification profile of the various training categories (see also De Grip, 1987).

Warncken (1986)[2] presents an indicator of the flexibility prevailing on the

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2. Sheldon (1985) mentiones two alternative specifications of such flexibility indicators. The disadvantage of the indicator developed by Kraft et al. is that its value depends on the number of 'adequately occupied' cells in the row or column to be analysed of, for instance, a training/occupation matrix. However, what must be understood by 'adequately occupied' remains unclear. The indicator developed by Heimer & Weisshuhn on the contrary does offer an alternative specification possibility:

$$DSO_i = \frac{\left(\sum_{j=1}^{J} \alpha_{ij}^2 \right)^{-1} - 1}{J-1} \qquad (6a)$$

labour-market: the 'Gini-Hirschman' coefficient. De Grip, Heijke, Dekker and Groot (1987) derived from that coefficient an indicator of the dispersion of occupations among the different sectors of industry. The computation of this sectoral-dispersion indicator of occupations proceeds as follows:

$$DSO_i = \left(1 - \sum_{j=1}^{J} \alpha_{ij}^2 \right) \frac{J}{J-1} \qquad (6)$$

Where: DSO_i = Gini-Hirschman coefficient of sectoral disperison of occupation i
α_{ij} = proportion of workers in occupation i employed in sector j
J = number of sectors

This indicator can assume values between 0 and 1. The value is 0 if the occupation occurs only in one sector of industry and 1 if the occupation is spread evenly over all sectors.

In a similar way, De Grip, Heijke, Dekker and Groot calculate an indicator of the occupational spread of the different categories of training:

$$DTS_k = \left(1 - \sum_{i=1}^{I} \gamma_{ki}^2 \right) \frac{I}{I-1} \qquad (7)$$

Where : DTS_k = Gini-Hirschman coefficient of occupational dispersion of training K
γ_{ki} = share of k-trained persons employed in occupation i in total number of workers with training k ($\gamma_{ki} = E_{ki}/E_k$)
I = number of occupations

A similar indicator can also be computed of the sectoral spread of training types:

$$DTO_k = \left(1 - \sum_{j=1}^{J} \beta_{kj}^2 \right) \frac{J}{J-1} \qquad (8)$$

Where : DTO_k = Gini-Hirschman coefficient of the dispersion spread of training k
β_{kj} = proportion of k-trained persons employed in sector j ($\beta_{kj} = E_{kj}/E_k$)
J = number of sectors

Similarly for the educational dispersion of occupations:

$$DOT_i = \left(1 - \sum_{k=1}^{K} \theta_{ki}^2 \right) \frac{K}{K-1} \qquad (9)$$

Where : DOT_i = Gini-Hirschman coefficient of the educational spread of occupation i
θ_{ki} = proportion of k-trained persons in occupation i ($\theta_{ki} = E_{ki}/E_i$)
K = number of types of training

With the above indicators, the outcomes were corrected for the aggregation level chosen by applying the correction terms J/J-1, I/I-1, and K/K-1 to, respectively, the number of sectors, occupations and training types distinguished. That does not mean that the aggregation has no longer any influence on the level of the indicator.

To measure labour-market flexibility, some rather arbitrary dividing lines must be drawn[3].

GH = 0	no dispersion at all; no flexibility; no alternatives (the ideal naive model)
$0 < GH \leq 0,3$	little dispersion/flexibility; few alternatives
$0,3 < GH \leq 0,7$	medium dispersion; some flexibility/ some alternatives
$0,7 < GH < 1,0$	wide dispersion/flexibility; many alternatives
GH = 1	even dispersion; total flexibility; unlimited alternatives (the ideal flexibility model)

The flexibility indicators presented here can be of great help to educational and occupational counselling. They add information to the medium-term forecasts of the labour-market prospects open to occupations and training types, and to the indicators of sensitiveness to cyclical movements. They also give an indication of the *alternatives open* to someone

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3. See also Warnken (1986) and De Grip, Heijke, Dekker, Groot (1987).

who chooses a certain type of training or a certain occupation. Obviously, that becomes particularly relevant when the labour market is developing unfavourably for the chosen education or occupation.

Besides, the indicator of an occupation's dispersion among types of training gives an impression of the competition among types of training with respect to the practice of that occupation. But even in isolation from the developments on the labour market, these flexibility indicators are valuable to educational and occupational counselling, because they give an idea how strongly a chosen study or occupation implies a commitment to a specific career.

Dispersion indicators can also be valuable for educational policy. They enable policy makers to find out whether the broadening of the curriculum of a certain type of training does indeed make schoolleavers more flexible on the labour market. The same holds, of course, for retraining in the framework of the labour-market policy.

The indicator of the training dispersion of occupations could be profitable to employers for their recruitment strategy, especially when they face bottlenecks in a certain labour-market segment. However, some complementary information about the categories of training to which the recruitment might be alternatively oriented is then needed.

At the moment, the indicators mentioned above can only be computed across all segments of the labour market for the occupational classes or groups and the training categories distinguished in the Labour-Force Censuses. For most policy objectives such information is not specific enough. A great improvement could be realised on that score on the basis of the RUBS schoolleaver survey proposed by some Education/Employment Contact Centres (COAs) and the National Committee for Educational Counselling (LCAS). Such data would permit the computation of indicators not only with regards to much more specific training categories, but in the long run also age- or cohort-specific dispersion indicators.

2.4.2. Passive and active substitution

The rows of the matrix of employed persons by training category and occupation provide information about the schools or courses that train people for a given occupation. Sheldon (1985) assumed that every type of training corresponds to one main occupation. The share of other training categories in the employment of that main occupation can then be interpreted as *passive substitution*, that is to say the *expulsion degree* of the training category for which that occupation is the principal one:

$$PS_k = 1 - \frac{E_{kb}}{E_b} = 1 - \theta_{kb} \qquad (10)$$

Where : PS_k = passive substitution degree of training k
E_{kb} = number of k-trained people employed in main occupation b
E_b = number of people employed in occupation b

But perhaps most training categories do not mainly correspond to one particular occupation, and on the other hand a given occupation might be the principal one for more than one type of training. For many occupations it is probably more realistic to establish what training categories, ordered by decreasing size, contribute, say, 80 per cent of the number of employed in a given occupation. That would produce a rather direct indicator of the flexibility employers have when recruiting staff for a given occupation.

Actually, the above criteria are intended to provide similar information as the indicator of training dispersion SBO_i (equation 9). But they do not, in fact, give much additional information. Employers would probably be supported better in their recruitment strategy by more specific information about the training backgrounds of those employed in a given occupation.

In addition to the 'passive substitution' for the main occupation, Sheldon distinguishes the *active substitution* of a type of training, in the sense of the potential mobility to alternative occupations:

$$AS_k = 1 - \frac{E_{kb}}{E_k} = 1 - \gamma_{kb} \qquad (11)$$

Where : AS_k = active substitution degree of training k
E_{kb} = number of k-trained employed in main occupation b
E_k = number of k-trained employed

Once more the snag is that for many training categories there does not exist one single main occupation. A flexibility indicator could be obtained by establishing in how many occupations, arranged by decreasing size, a total of, say, 80 per cent of the people with a given training are employed. The same information is envisaged as with the flexibility indicator DTS_k (equation 7). With respect to the availability of the data required to compute these indicators, the reader is once more referred to section 2.4.1.

2.4.3. Employment outside the occupational domain

Once the range of occupations corresponding to a type of training has been established from the opinions of experts, the proportion of graduates employed *'outside their own domain'* can be derived from the occupational structure of the workforce with the educational background concerned:

$$OD_k = 1 - \left(\sum_{i \epsilon I'} \gamma_{ki} \right) \qquad (12)$$

Where : OD_k = indicator of the number of k-trained persons employed outside envisaged occupational domain of training k
I' = set of occupations counted to the range of occupations of training k

This index could be a measure of the potential mobility of graduates to occupations not counted to their own domain; it can be considered a specific expression of active substitution. A weakness of this index is the arbitrary delimitation of the envisaged occupational domain of many types of training.

The information is interesting mainly because it serves as an indicator of the performance of various types of training, which can be relevant to educational as well as counselling policies. The problem is, however, that the positive or negative nature of the alternative openings to other domains is hard to appreciate beforehand. The appreciation will mostly be negative if the alternatives are occupations for which a lower education suffices ('bumping down'). The indicator suggested here can be computed only when the envisaged occupational domain of a specific type of training is firmly

established. Surveys among graduates could subsequently supply appropriate data from which to establish the indicator.

2.4.4. Bumping-down indicator

If occupations could be characterised by function level, we could assess how far moving to alternative occupations outside the domain associated with a certain type of training must be considered as bumping down processes. Such an underutilisation indicator can be computed as follows:

$$BD_k = \sum_{i \epsilon I(k)} \frac{E_{ki}}{E_k} = \sum_{i \epsilon I(k)} \gamma_{ki} \quad ,(I(k) \subset I) \qquad (13)$$

Where : BD_k = bumping-down indicator of training k
$I(k)$ = set of occupations whose function level is inferior to the one concomitant with to the level of training k

To define the function level of occupations is by no means simple. Moreover, the definition has to be updated periodically. Finally, a scale would have to be developed on the basis of empirical research, by which the *underutilisation degree* of the graduates of a certain type of training can be measured.

The bumping-down indicator can be used to monitor the allocation process on the labour market for the benefit of education policies and labour-market policies. Because it measures the chance of graduates from a certain type of training ending up in functions for which a lower education would suffice, this indicator is also useful to educational and occupational counselling. For that purpose, the bumping-down indicator could complement the medium-term forecasts of the chance of work provided by a certain type of training.

In the years past the CBS has classified occupations (on the four-digit level) by function level (see Huijgen, Riesewijk and Conen 1983). Unfortunately the insufficient scope of the Labour-Force Censuses does not permit the establishment of the training pattern of occupations on that low level of aggregation. In that respect, too, schoolleaver surveys might be an important complementary source of data.

2.5. Competitive power of training categories

Haanstra, Koppen and Oostwoud Wijdenes (1987) proposed deriving an indicator of the degree to which types of training have to compete for certain occupations, from the proportion of registered unemployed persons of a given occupation with that particular training:

$$CP_{ki}(1) = \frac{U_{ki}}{U_i} \tag{14}$$

Where : $CP_{ki}(1)$ = competitive power of training k in occupation i
U_{ki} = number of unemployed k-trained persons with occupation i
U_i = number of unemployment in occupation i

A second possibility is to look at the share of the workers in an occupation that followed a particular training.

$$CP_{ki}(2) = \frac{E_{ki}}{E_i} = \theta_{ki} \tag{15}$$

In this way the competitive power of a particular training within all occupations can be determinded. Empirical research could be helpful in determing a typology (good, bad, etcetera) on this point.

The first indicator has an important disadvantage, because if a great share of the unemployed in an occupation has followed a particular training, there does not exist a clear interpretation. Haanstra, Koppen and Oostwoud Wijdenes (1987) assume that a high ratio stands for little competition with unemployed with an other education. However, a high ratio can also stand for a situation in which persons with a particular training face more difficulties in finding work than workers who followed other studies. Therefore the first indicator is unsuitable.

This problem does not arise for the second indicator; here it is justified to interpret a high ratio as an indicator of a good competitive power of a particular training background. However, this indicator is based on data with regards to workers with the particular educational background, who found a job in the occupation in the past. One may doubt if persons who followed the same study, and search for a job at this moment will also be

offered these jobs. Therefore it is probably better to look at the mutation of the share of the workers in an occupation with the particular educational background, because such mutations are important for newcomers' chances to find work. The indicator then becomes:

$$CP_{ki}\ (3) = \Delta\ \theta_{ki} \qquad (16)$$

Where : $\Delta\ \theta_{ki}$ = mutation of the share of k-trained workers in total employment in occupation i

The competitive power of a particular training in an occupation can then be qualified as follows:

$CP_{ki}(3) > 0$	good/improving competitive power
$CP_{ki}(3) = 0$	stable competitive power
$CP_{ki}(3) < 0$	bad/worsening competitive power

For the time being, the indicator CP_{ki} (3) is preferred for measuring the competitive power of a type of training on the various occupational sub-markets. Being occupation-specific, this indicator has to be computed for each type of training for each separate occupational category.

To define the competitive power of a type of training on an occupational sub-market is obviously important for educational and occupational counselling. It also provides the makers of educational and retraining policies with an indication of the performance of study branches or schools. Preferably, the competitive training types should thereby be pointed out as well.

At the moment, the above indicators for broad occupational categories and clusters of study branches can be computed with the help of data from the CBS Labour-Force Censuses. If more detailed data material came available from surveys among graduates, the competitive power of more specific study branches of study - possibly in more specific work areas - could be measured.

2.6. Access and quit mobility of occupations

Sheldon (1985) has established, from occupation-mobility data, the access

and quit mobility of occupations through a given period of time. From a matrix with the numbers of employed in the various occupations at time t-s along the y-axis and the same data at time t along the x-axis, the access and quit mobility in the period t-s to t can be established for every occupation. The data refer only to workers employed at time t-s as well as at time t.

The access mobility to occupation i can then be established as follows: $n_{.i} - n_{ii}$. Transformation of the absolute figures into an indicator of relative access mobility gives:

$$AM_i = \frac{n_{.i} - n_{ii}}{n_{i.}} \qquad (17)$$

Where : AM_i = indicator of access mobility into occupation i
n_{ii} = number of workers who have stayed employed in occupation i
$n_{.i}$ = workers employed in occupation i at moment t
$n_{i.}$ = workers employed in occupation i at moment t-s

By the same principle, a measure of the quit mobility (QM_i) can be constructed:

$$QM_i = \frac{n_{i.} - n_{ii}}{n_{i.}} \qquad (18)$$

Combination of the two produces the net mobility (NM_i) of occupation i:

$$NM_i = AM_i - QM_i \qquad (19)$$

The above indicators convey, respectively, what proportion of those entering an occupation have come from other occupation categories, what proportion of those employed in an occupation pass to other occupations, and finally the position an occupation holds in the professional careers of workers; in that respect, the following characteristics obtain:

$NM_i < 0$ entrance or throughflow occupation
$NM_i > 0$ terminal occupation

The value of the indicators will be influenced the development of

employment in the occupation in question and the supply of schoolleavers and re-entrants in the labour-market segment concerned.

Empirical research is needed to establish what values of the indicators AM_i and QM_i must be considered high or low.

The net-mobility indicator (NM_i) can be helpful in educational and occupational counselling to determine to what extent certain occupations are open to schoolleavers. Employers may use it to monitor the development of the access and quit mobility of occupations (equations 17 and 18, respectively).

Establishment of the above indicators from a data file referring to re-trained workers would give an idea of the effectiveness of the re-training.

At the moment the above indicators must be based on limited samples, like the OSA-panel, and therefore can be computed only on a high level of aggregation. There are plans to add a retrospective question about the occupation practiced at an earlier point of time to the Population Survey. If these plans are realised, the indicators could be computed at a lower level of aggregation. However, to expect a disaggregation below the two-digit level would be unrealistic.

3. RELATION BETWEEN FORECASTS AND INDICATORS OF THE LABOUR MARKET

3.1. Labour-market indicators as additional key-ratio's

Almost all labour-market indicators discussed in this study can serve as additional sources of information besides the forecasts of the medium-term laour-market prospects of training types and occupations. That holds first and foremost for indicators with an important *monitoring* function, such as the indicator of current scarcity on the labour market (section 2.1), the absorption degree (section 2.2), the indicator of potential mobility out of particular occupations and types of training (section 2.4), and the indicator of the competitiveness of training categories (section 2.5). The indicator of present scarcities on the labour market may moreover serve as an *early warning indicator* of the realisation of predictions in medium-term forecasts.

The indicator of the sensitiveness to cyclical movements of occupations and training categories (section 2.3), too, can be presented along with the forecasts of the medium-term prospect. The same is true of the indicators of the access and quit mobility of occupations (section 2.6). The indicator of the (historical) replacement demand is the only one which does not add any essential information to medium-term forecasts.

In particular the indicator of sensitiveness to cyclical movements, the indicators of alternative possibilities and the indicator of the competitiveness of training categories provide information which, as a complement to that from the medium-term forecast, is useful when it comes to policy making and study choices under conditions of uncertainty about the developments on the labour market. These indicators might also be used in combination with medium-term forecasts to produce an overall profile of the (prospects on the) labour market of occupations and studies. A first attempt at such an approach has been made in De Grip, Heijke, Dekker and Groot (1987). In their study, occupations are characterised on the basis of medium-term forecasts of employment and the indicator of sectoral dispersion, and training categories on the basis of medium-term forecasts (the labour-market perspective) and the indicator of occupational dispersion.

The sensitiveness to cyclical movements adds to the medium-term forecasts information about the degree to which the envisaged employment (development) of a category of occupation or training will be stable or rather subject to strong fluctuations.

Besides, the two dispersion indicators supply information about the alternatives available on the labour market once a given occupation or training has been chosen. The more alternatives there are, the less working people are dependent on the developments on that particular segment of the labour market.

The indicators of the chances of work outside one's own sector or of work below (or above) one's own level of education, give important complementary information on that score. The same is true of the indicator of the competitiveness of training courses.

3.2. Integration of labour-market forecasts and indicators

Sheldon (1985) made an attempt to integrate mobility indicators fully in the forecasts of the labour-market prospects of different occupations. To that end, instead of giving an exact 'point forecast', he determined a *'flexibility corridor'* within which the supply of a given occupational category can respond to the situation on the labour-market segment concerned.

Sheldon proceeds as follows. First, a forecast is drawn up of employment in a given occupation. Next, a point forecast is made of the supply of labour for that occupation based on the inflow from the training categories for which that occupation is the principal one. A forecast of surplus demand will not automatically entail a tight labour market, because the supply of labour on the labour-market segment in question may exceed that forecast on the strength of the supply in the training category for which occupation i is the main one. The additional supply can be calculated as follows (see Sheldon 1985, p. 185 ff.);

$$ASP_i(1) = \sum_{k \neq k'} (E_{ki}/E_k)\ \hat{A}_k = \sum_{k \neq k'} \gamma_{ki}\ \hat{A}_k \qquad (20)$$

Where : $ASP_i(1)$ = maximum additional supply in case of short supply of occupation i
k' = training category for which i is the principal occupation
$\hat{A}_k$ = forecast inflow on the labour market of labour from training category k ($k \neq k'$)

We observe that this calculation uses the possibility of passive substitution into the principal occupation of training k'. In that situation, the original point forecast is the lower limit of the supply forecast for occupation i. Addition of the potential additional supply produces the upper limit of the flexibility corridor.

Similarly, the lower limit of the flexibility corridor can be calculated for the case of a supply surplus for occupation i. The assumption is then that a proportional part of the new inflow into the labour market of labour with educational background k ($(E_{k'} - E_{k'i})/E_{k'}$) will find work outside the principal occupation:

$$QSP_i = [(E_{k'} - E_{k'i}) / E_{k'}] \hat{A}_{k'} \qquad (21)$$

Where : QSP_i = maximum portion of supply moving out in case of a surplus supply of occupation i

The great weakness of Sheldon's approach is the assumption that a particular occupation is the principal occupation for a given training category, an assumption which is untrue in many cases. We can circumvent this assumption by first drawing up a point forecast of the expected supply of labour of occupation i on the basis of present shares of the various training categories in the employment in occupation i. As far as a comparison of this supply forecast with the demand forecast of occupation i shows up a short supply, the potential additional supply could be calculated as follows:

$$ASP_i(2) = \sum_{k=1}^{K(i)} [(1 - \gamma_{ki}) \hat{A}_k] \qquad (22)$$

Where : γ_{ki} = share in total number of k-trained labour

In that way the upper limit of the flexibility corridor can be computed. The assumption is then that every training background with which occupation i is actually practiced, is adequate and therefore equips those entering the labour market for that occupation. Obviously the upper limit in that case may rise very high. To avoid that, the condition could be made that a training category must surpass a certain minimum share in an occupation to be considered an adequate recruitment source for that occupation.

With a similar approach in a situation of surplus supply, as calculated in equation (21), the outmoving supply is in fact included in the point forecast as such, since the assumption is then that the present shares of the various training categories in employment in each single occupation can be projected on the future supply of labour for that particular occupation.

In the calculations made above of the upper and lower limits of an occupation's flexibility corridor, each occupation has been considered in isolation. That is to say, no account has been taken of the push or pull effects of other labour-market segments. As a result, the width of the flexibility corridors of the various occupations can be overestimated. A better method to determine the lower limit of the flexibility corridor for a given occupation is therefore to derive the access mobility to the labour-market segments marked by short supply proportionally from the sub-markets for which a surplus supply has been calculated. The shortages elsewhere on the labour market ($D_{i"} - S_{i"}$) then determine the alternatives for a surplus occupation:

$$QSP_{i'}(2) = \sum_{k=1}^{K} \left(E_{ki'} / \sum_{i' \epsilon I'} E_{ki'}\right) \sum_{i" \epsilon I"} \theta_{ki"} \left(\hat{D}_{i"} - \hat{S}_{i"}\right) \qquad (23)$$

Where : i' = occupation for which surplus supply has been initially forecasted
i" = occupation for which short supply has been initially forecasted
$\theta_{ki"}$ = share of k-trained persons employed in occupation i"
$\hat{D}_{i"}$ = total demand forecast in occupation i"
$\hat{S}_{i"}$ = total supply forecast in occupation i"

In this equation, the additional potential inflow into the occupations for which supply is short is divided among the various training categories in proportion of the training shares in each particular occupation:

$Q_{ki"}$ $(\hat{D}_{i"} - \hat{S}_{i"})$. These potential additional inflows are subsequently rationed among the surplus occupations in proportion to the number of k-trained people employed in each occupation in comparison with the total number of k-trained people in the occupations with surplus labour:

$$E_{ki'} / \sum_{i'\epsilon I'} E_{ki'}$$

The above calculation method is an improvement on Sheldon's method in the sense that the flexibility forecasts on the various occupational sub-markets produce a consistent overall picture. That is only true, however, in the case of a macro-economic excess supply. As far as a macro-economic supply shortage is expected, the overall picture could be made consistent by rationing the potential additional labour in the shortage sectors.

The same approach could indeed be followed to achieve more flexible forecasts of the labour-market situation for various training categories. For instance, for training categories for which an excess supply is expected, the potential additional demand could be established as follows:

$$ADM_k = \sum_{i"\epsilon I"} \theta_{ki"} (\hat{D}_{i"} - \hat{S}_{i"}) \qquad (24)$$

Where : ADM_k = potential additional demand in case of excess supply of workers with educational background k

4. CONCLUSION

As pointed out in the introduction, this study is intended to give a first inventory of the labour-market indicators which add to the medium-term forecasts information about the (development of) the labour market of occupations and training types. In each instance we have indicated for what purposes that information could be helpful. Finally, chapter 3 has explained how the additional information can be combined with forecasts of labour-market prospects. The simplest way is to produce an overall typology of occupations and training types consisting of both components, that is to say, forecasts besides complementary indicators (see section 3.1). However, with respect to the potential occupational mobility of labour supply, the prevailing flexibility can be integrated in the forecasts of the labour-market prospects of occupations and training types (section 3.2). In that case the possibility should be investigated of delimitating the labour-market segments for which forecasts are to be drawn up, in such a way - by cluster analysis, for instance - that the labour-market flexibility is for the greater part contained within those segments (see De Grip, Groot and Heijke 1987, and Teulings and Vriend 1987).

Table 2. surveys the various types of labour-market indicators discussed in this study. It points out in succession:

- whether an indicator could be used for monitoring purposes;
- whether an indicator adds information to medium-term forecasts of labour-market prospects that can be included in an overall typology of occupations and training types;
- whether integration with medium-term forecasts is possible;
- for what purposes the indicator can be useful.

Table 2. Review of the labour-market indicators discussed

	Function within information system			Policy objectives			
	MF	UT	IMTF	EOC	EP	RTP	ERS
- Current scarcity	yes			yes	yes	yes	yes
- Replacement demand				yes			yes
- Absorption degree		yes		yes	yes		
- Sensitivity to the business cycle		yes		yes		yes	
- Dispersion indicators	yes	yes		yes	yes	yes	(yes)
- Passive substitution	yes	(yes)	yes				(yes)
- Active substitution	yes	(yes)	yes	yes	yes	yes	
- Outside occupational domain	yes	yes		yes	yes	yes	
- Bumping-down	yes	yes		yes	yes		
- Competitive power	yes	yes		yes	yes		
- Access and quit mobility		yes	yes	yes	yes	yes	yes

Bron: ROA

Explanation of abbreviations:

MF = Monitoring function
UT = Useful in overall typology
IMTF = Integration with medium-term forecasts
EOC = Educational and occupational counselling
EP = Education policies
RTP = Re-training policies
ERS = Employers' recruitment strategies

LITERATURE

Bergeijk, C. van, A. de Grip (1986), Bestaan en ontwikkeling van interne arbeidsmarkten in Nederland, in: *Sociaal Maandblad Arbeid*, p. 437-451.

Dekker, R.J.P., A. de Grip, J.A.M. Heijke (1988), *Een verklaring van de beroepenstructuur van bedrijfstakken*, ROA-W-1988/2, Maastricht.

Grip, A. de (1987), *Onderwijs en Arbeidsmarkt: Scholingsdiscrepanties*, VU-uitgeverij, Amsterdam.

Grip, A. de, J.A.M. Heijke, L.A. Vos (1987), *Inventariserend onderzoek arbeidsmarktmodule I-SEE project*, ROA-R-1987/1, Maastricht.

Grip, A. de, J.A.M. Heijke, R.J.P. Dekker, L.F.M. Groot, L.A. Vos (1987), *De arbeidsmarktperspectieven van studierichtingen in het wetenschappelijk onderwijs 1992; Arbeidsmarktmodule I-SEE project,* ROA-R-1987/3, Maastricht.

Grip, A. de, J.A.M. Heijke, R.J.P. Dekker, L.F.M. Groot (1987), *De arbeidsmarkt naar beroep in 1992 en de positie van academici daarbinnen,* ROA-W-1987/1, Maastricht.

Grip, A. de, L.F.M. Groot, J.A.M. Heijke (1987), *Clustering occupational classes by educational structure*, ROA-W-1987/2E, Maastricht.

Haanstra, F., J.K. Koppen, J.D. Oostwoud Wijdenes (1987), *De samenhang onderwijs-beroepspraktijk in de sector van de beeldende kunsten,* Ministerie van Onderwijs & Wetenschappen, Staatsdrukkerij, 's-Gravenhage.

Heijke, J.A.M. (1986), *Het Researchcentrum voor Onderwijs en Arbeidsmarkt,* ROA-R-1986/1, Maastricht.

Hoof, J.J. van, J. Dronkers (1980), *Onderwijs en arbeidsmarkt,* Sociologische monografieën, Van Loghum Slaterus, Deventer.

Huijgen, F., B.J.P. Riesewijk, G.J.M. Conen (1983), *De kwalitatieve structuur van de werkgelegenheid in Nederland-Bevolking in loondienst en functie-niveaustructuren in de periode 1960-1977,* NPAO, 's-Gravenhage.

Jonker, J.K. (1987), *Op weg naar een nieuwe CBS-beroepenclassificatie* discussienota, CBS, Voorburg.

Nederlands Economisch Instituut (1972), *Bouwnijverheid: planning, groei en fluctuaties, deel II: fluctuaties*, Rotterdam

Paridon, W.C.G.M. van (1987), De arbeidsmarktindicator, in: *Management Berichten*, jrg. 13, nr. 3, p. 42-46.

Sheldon, G. (1985), *Die berufliche und geographische Flexibilität*, Institut für Arbeitsmarkt und Berufsforschung der Bundesanstalt für Arbeit, Beitrage AB 92, Nürnberg.

Teulings, C., N. Vriend (1987), *Een empirische afbakening van beroepsdeelmarkten,* SEO, Amsterdam.

Warnken, J. (1986), Zur Entwicklung der "internen" Anpassungsfähigkeit der Berufe bis zum Jahre 2000. Projektionen unter den Annahmen der Wachstumsszenarien der Prognos-Studie, *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung*, no. 1, p 119-133.